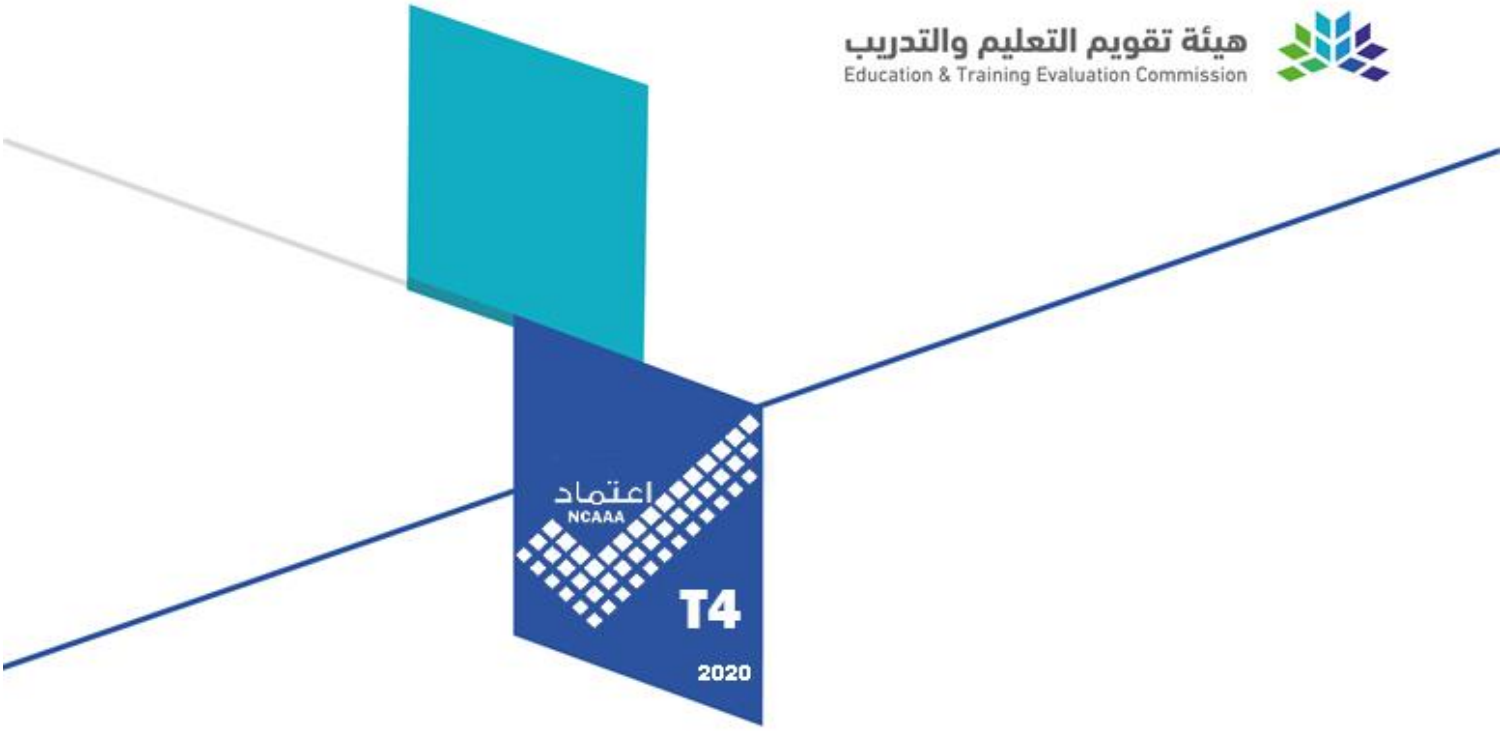
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission




# Course Specifications

| | |
|---|---|
| **Course Title:** | Differential Equations II |
| **Course Code:** | MATH305 |
| **Program:** | Bachelor of Science in Mathematics |
| **Department:** | Mathematics |
| **College:** | Science |
| **Institution:** | University of Tabuk |

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## A. Course Identification

| |
|---|
| **1. Credit hours: 03 Hours/Week** |
| **2. Course type**<br>**a.** University ☐ College ☐ Department ☑ Others ☐<br>**b.** Required ☑ Elective ☐ |
| **3. Level/year at which this course is offered: L6/Y3** |
| **4. Pre-requisites for this course** (if any)**: Math 204** |
| **5. Co-requisites for this course** (if any)**:**<br>None |

**6. Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | **Traditional classroom** | 45 | 100% |
| 2 | **Blended** | | |
| 3 | **E-learning** | | |
| 4 | **Distance learning** | | |
| 5 | **Other** | | |

**7. Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 45 |
| 2 | **Laboratory/Studio** | |
| 3 | **Tutorial** | |
| 4 | **Others** (specify) | |
| | **Total** | 45 |

## B. Course Objectives and Learning Outcomes

**1. Course Description**

The main purpose of this course is to provide students with the importance of advanced differential equations in mathematical and Engineering Science, knowledge by learning the System of first-order differential equations, Series solutions of first-order differential equations with some applications, derivatives, and integrals of Laplace transform.

**2. Course Main Objective**

-Student will be able to recognize the importance of the advanced differential equations in mathematical and Engineering Science, by learning a variety of methods of solving differential equations.

**3. Course Learning Outcomes**

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Students will be able to recall knowledge of the concepts of differential equations | **K1** |
| 1.2 | Students will be able to recognize methods of differential equations in practical problems. | **K2** |
| 1.3 | | |

| CLOs | | Aligned PLOs |
|---|---|---|
| 1... | | |
| **2** | **Skills :** | |
| 2.1 | Students will be able to evaluate solution of differential equations using Laplace transform | S1 |
| 2.2 | Students will be able to analyze the mathematical problems using Fourier Legendre and Fourier Bessel Series. | S1 |
| 2.3 | Students will be able to solve physical problems using above techniques. | S3 |
| 2.4 | Students will be able to communicate with Peers and Lectures | S5 |
| **3** | **Values:** | |
| 3.1 | Students will be able to develop enhanced self-learning. | V1 |
| 3.2 | Students will be able to work independently and in groups. | V1 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | System of first-order equations- Introductory remarks | 3 Hrs |
| 2,3 | Homogenous linear system with constants coefficients. | 6 Hrs |
| 4 | Introduction and review of power series | 3 Hrs |
| 5 | Series solutions of first-order DE | 3 Hrs |
| 6 | **Mid-Exam#1** | |
| 6 | Second order differential equations – ordinary points | 3 Hrs |
| 7 | Laplace transform, introduction | 3 Hrs |
| 8,9 | Derivatives of Laplace transform | 6 Hrs |
| 10,11 | Integrals of Laplace transform | 6 Hrs |
| 11 | **Mid-Exam#2** | |
| 12,13 | Applications to Differential Equations. | 6 Hrs |
| 14 | Nonlinear differential equations- Introduction - Methods of solutions | 3 Hrs |
| 15 | **Revision & Final Exam** | 3 Hrs |
| | **Total** | **45 Hrs** |

## D. Teaching and Assessment

**1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods**

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| 1.1 | Students will be able to recall knowledge of the concepts of differential equations | Introducing new ideas through case study Lectures Class Discussions | Quizzes I II Midterm Exams Final Exams homework assignments. |
| 1.2 | Students will be able to recognize methods of differential equations in practical problems. | | |
| **2.0** | **Skills** | | |
| 2.1 | Students will be able to evaluate solution of differential equations using | | |

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| | Laplace transform | Lectures<br>Class Discussions<br>Class presentation | Quizzes<br>I II Midterm Exams<br>Final Exams<br>Homework assignments. |
| 2.2 | Students will be able to analyze the mathematical problems using Fourier Legendre and Fourier Bessel Series. | | |
| 2.3 | Students will be able to solve physical problems using above techniques. | | |
| 2.4 | Students will be able to communicate with Peers and Lectures | | |
| | | | |
| **3.0** | **Values** | | |
| | | Lectures<br>Class Discussions<br>Group work | Quizzes<br>Homework assignments. |
| 3.1 | Students will be able to develop enhanced self-learning. | | |
| 3.2 | Students will be able to work independently and in groups. | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Home works and Assignments and Quizzes | Weekly basis | 10% |
| 2 | First mid-term exam | 6th week | 25% |
| 3 | Second mid-term exam | 11th week | 25% |
| 4 | Final Exam | At end of the Semester | 40% |

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**
Six office hours per week in the lecturer schedule.

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | Differential Equations:3rd. Edit. (1998): John Wiley & Sons. , Inc. Author ; Shepley L. Ross |
| **Essential References Materials** | Allan Struthers, Merle Potter, Differential Equations for Scientists and Engineers, Springer, 2019<br>Adkins, William A., and Mark G. Davidson. "Linear Constant Coefficient Differential Equations." Ordinary Differential Equations. Springer, New York, NY, 2012. 275-329. |
| **Electronic Materials** | None |
| **Other Learning Materials** | None |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation** (Classrooms, laboratories, demonstration rooms/labs, etc.) | 1.Lecture Room with max capacity of 30 students and equipped with White Board, Overhead projector and internet connection.<br><br>2.Library |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | Projectors |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | None |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment | Students | Direct and Indirect |
| Extent of achievement of course learning outcomes | Teachers | Direct |
| Quality of learning resources | Students | Indirect |
| | | |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | Program and study plan committee |
| **Reference No.** | |
| **Date** | 25/08/2021 |